REMARKS

I. Introduction

With the cancellation without prejudice of claims 22 to 25, 36 and 37, and with the addition of claim 39, claims 20, 21, 26 to 35, 38 and 39 are pending in the present application. In view of the foregoing amendments and the following remarks, it is respectfully submitted that the present application is in condition for immediate allowance, and reconsideration is respectfully requested.

Applicants express appreciation for the acknowledgement of the claim for foreign priority and the indication that all copies of the certified copies of the priority documents have been received from the International Bureau.

II. Rejection of Claims 20 to 25, 27 to 30, 34, 36 and 37 Under 35 U.S.C. § 102(b) ("Collings et al.")

Claims 20 to 25, 27 to 30, 34, 36 and 37 were rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 6,054,823 ("Collings et al."). It is respectfully submitted that Collings et al. do not anticipate the present claims for at least the following reasons.

Claim 20 relates to a method for determining an operating state on triggering a fan motor, including: operating the fan motor via a switching device; triggering the switching device via a pulse-width-modulated triggering signal, a pulse duty factor of the triggering signal predefining a triggering state of the fan motor; measuring as a measured variable one of a voltage potential at a node between the fan motor and the switching device and a motor current; and determining an operating state on triggering the fan motor as a function of the measured variable and the pulse duty factor.

Although Applicants may not agree with the merits of the rejection, to facilitate matters, claim 20 has been amended to incorporate the features of claims 22 and 23, and claims 22 and 23 have been canceled without prejudice. Claim 20 as amended recites, in relevant parts, that the method for determining an operating state on triggering a fan motor further includes: recognizing an open load fault if the voltage potential essentially corresponds to a supply voltage potential of the fan motor applied to the switching device; and upon recognition of an open load fault, switching the switching device through for a specific period of time, in order to apply

a maximum voltage to the fan motor, so that merely oxidized connection points are cleaned.

Collings et al. do not disclose, or even suggest determining an operating state on triggering a fan motor as a function of a measured variable and a pulse duty factor. Collings et al. do describe an apparatus for sensing the rotation of a brushless DC fan that includes a fan unit (120), the fan (160), a fan controller (130) and a sense/driver circuit (150). In addition, the sense/drive circuit (150) includes a sense circuit (1001) that is able to output a sense signal (270) indicative of the speed of fan (160). Furthermore, as indicated in column 7, lines 20 to 29 of Collings et al., the sense signal (270) includes a pulse for each commutation event of the rotating fan (160), and the speed of the fan (160) may be calculated from the time of fan operation, the number of commutation events indicated by the pulses in sense signal (270) and the number of poles of fan (160). ***However, Collings et al. do not determine the speed of the fan (160) using a pulse duty factor of signal (270) (i.e., pulse duration divided by signal period), but only using the number of pulses per unit time.***

In addition, Collings et al. do not disclose, or even suggest, that upon recognition of an open load fault, a switching device is switched through for a specific period of time, in order to apply a maximum voltage to a fan motor, so that merely oxidized connection points are cleaned. In column 5, lines 50 to 64, Collings et al. indicate that when a control signal provided by fan controller (130) to a transistor (222) has a first value, the transistor (222) is conducting and full power is applied to fan (160). ***However, Collings et al. nowhere mention that transistor (222) is switched through upon recognition of an open-load fault.***

Accordingly, it is respectfully submitted that Collings et al. do not anticipate claim 20 for at least the above reasons.

New claim 39 has been drafted to include the features of claim 20, prior to amendment, as well as the features of claims 24 and 25, claims 24 and 25 have been canceled and claim 26 has been amended to change its dependency from claim 24 to claim 39. Claim 39 recites, in relevant parts, that a method for determining an operating state on triggering a fan motor includes: determining an operating state on triggering a fan motor as a function of a measured variable and a pulse duty factor; recognizing a normal operation if the voltage potential is essentially proportional to the pulse duty factor and the voltage potential is in a defined voltage range in relation to an applied pulse duty factor; and determining the defined voltage

range by a measurement at a defined applied supply voltage at different pulse duty factors.

As explained above, Collings et al. do not disclose, or even suggest, the feature of determining an operating state on triggering a fan motor as a function of a measured variable and a pulse duty factor. In addition, Collings et al. do not disclose, or even suggest, determining a defined voltage range by a measurement at a defined applied supply voltage ***at different pulse duty factors***. Accordingly, it is respectfully submitted that Collings et al. do not anticipate claim 39 for at least these reasons.

Claim 29 relates to a control circuit for a fan motor for determining an operating state on triggering the fan motor, including: a switching device having a terminal for connection to a first supply potential; a pulse width modulation circuit for triggering the switching device using a pulse-width-modulated signal having a pulse duty factor, the fan motor being connectable between a second supply potential and the switching device; a measuring circuit for picking up a measured variable at the switching device; and an analyzer circuit for checking the measured variable and determining the operating state as a function of the measured variable and the pulse duty factor.

Although Applicants may not agree with the merits of the rejection, to simplify matters, claim 29 has been amended to incorporate the features of claims 36 and 37, claims 36 and 37 have been canceled without prejudice and claim 38 has been amended to change its dependency from claim 37 to claim 29. Claim 29 as amended recites, in relevant parts, that the measuring circuit measures a motor current through the fan motor, and that the switching device includes a sense FET to measure the motor current through the fan motor.

As set forth in detail above, Collings et al. do not disclose, or even suggest, that an operating state is determined as a function of a measured variable and a pulse duty factor. In addition, Collings et al. do not disclose, or even suggest, that a switching device includes a sense FET to measure motor current through a fan motor. As indicated in column 9, lines 20 to 46, the apparatus of Collings et al. may include a bipolar NPN transistor, a bipolar PNP transistor, a field effect transistor, etc. However, Collings et al. nowhere mention a sense FET for measuring motor current through a fan motor. Accordingly, it is respectfully submitted that Collings et al. do not anticipate claim 29 for at least these reasons.

As mentioned above, claims 22 to 25, 36 and 37 have been canceled without prejudice, thereby rendering moot the rejection with respect to these claims.

As regards claims 21, 27 and 28, and claims 30 and 34, which ultimately depend from claims 20 and 29, respectively, and therefore include all of the features of claims 20 and 29, respectively, it is respectfully submitted at Collings et al. do not anticipate these dependent claims for at least the reasons set forth above.

As regards claim 30, it is respectfully submitted that Collings et al. do not anticipate this claim for the following additional reasons. Collings et al. do not disclose, or even suggest, that a control circuit for a fan motor includes a filter circuit adapted to smooth a measured variable in such a way that the measured variable is essentially proportional to a pulse duty factor. In column 6, lines 11 to 26, Collings et al. do indicate that low pass filter (250) attenuates higher frequency components contained in an input waveform V1 and passes lower frequency, rotational energy components of the input waveform to provide waveform V2 at filter output/comparator input node (255). ***However, Collings et al. nowhere mention that low pass filter (250) smooths V1 such that output voltage V2 is essentially proportional to a pulse duty factor***. Accordingly, it is respectfully submitted that Collings et al. do not anticipate claim 30 for these additional reasons.

In view of all of the foregoing, withdrawal of this rejection is respectfully requested.

III. Rejection of Claims 20, 22, 29 and 34 to 37 Under 35 U.S.C. § 102(e) ("Yoshimura")

Claims 20, 22, 29 and 34 to 37 were rejected under 35 U.S.C. § 102(e) as anticipated by U.S. Patent No. 6,512,346 ("Yoshimura"). It is respectfully submitted that Yoshimura does not anticipate the present claims for at least the following reasons.

As an initial matter, claims 22, 36 and 37 have been canceled without prejudice, thereby rendering moot the rejection with respect to these claims.

As regards claim 20, Yoshimura describes a motor driving apparatus (10), which includes, inter alia, a driving circuit (20), a switching element or transistor (Tr1), a DC motor (2), a cooling fan (50) and a battery (4). In addition, as indicated in column 4, lines 16 to 27, the motor driving apparatus further includes a driving circuit for supplying a driving current to the DC motor (2) by turning on and off

transistor (Tr1) in accordance with a control signal Sb to drive the DC motor (2). However, Yoshimura does not disclose, or even suggest, a method for determining an operating state on triggering a fan motor, including, upon recognition of an open load fault, switching a switching device through for a specific period of time, in order to apply a maximum voltage to a fan motor, so that merely oxidized connection points are cleaned. Yoshimura nowhere mentions that transistor (Tr1) is switched through to apply a maximum voltage to DC motor (2) in response to recognition of an open load fault. Accordingly, it is respectfully submitted that Yoshimura does not anticipate claim 20 for at least these reasons.

As for claim 29, Yoshimura does not disclose, or even suggest, that a measuring circuit measures a motor current. The motor driving apparatus (10) of Yoshimura does include an average voltage detection circuit (19) for measuring the voltage across DC motor (2), as well as a disconnection/shorting detection circuit (20) for detecting disconnecting and shorting on a current path from the battery (4) to the transistor (Tr1) via DC motor (2). However, Yoshimura provides no circuit for measuring a current through the DC motor (2). Furthermore, Yoshimura does not disclose, or even suggest, that a switching device includes a sense FET to measure a motor current through a fan motor. As indicated in column 11, lines 1 to 14, Yoshimura mentions that NPN and PNP transistors and p-channel and n-channel MOSFET's can be used as switching elements for the motor driving apparatus (10). However, Yoshimura does not mention a sense FET as a possible switching element. Accordingly, it is respectfully submitted that Yoshimura does not anticipate claim 29 for at least these reasons.

As for claims 34 and 35, which depend from claim 29 and therefore include all of the features of claim 29, it is respectfully submitted that Yoshimura does not anticipate these dependent claims for at least the reasons set forth above.

In view of all of the foregoing, withdrawal of this rejection is respectfully requested.

IV. Rejection of Claims 31 to 33 Under 35 U.S.C. § 103(a) ("Yoshimura" and "Erdman et al.")

Claims 31 to 33 were rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Yoshimura and U.S. Patent No. 5,075,608 ("Erdman et al."). It is respectfully submitted that the combination of Yoshimura and

Erdman et al. does not render these claims unpatentable for at least the following reasons.

Claims 31 to 33 ultimately depend from claim 29 and therefore include all of the features of claim 29. As set forth in detail in Section III of this response, Yoshimura does not disclose, or even suggest, all of the features of claim 29. Erdman et al. merely describe a control system and a method for an electronically commutated motor and are not relied upon for disclosing or suggesting the features of claim 29 not disclosed or suggested by Yoshimura. Accordingly, it is respectfully submitted that the combination of Yoshimura and Erdman et al. does not render unpatentable claims 31 to 33, which ultimately depend from claim 29.

In view of all of the foregoing, withdrawal of this rejection is respectfully requested.

V. Rejection of Claims 26 and 31 to 33 Under 35 U.S.C. § 103(a) ("Collings et al." and "Erdman et al.")

Claims 26 and 31 to 33 were rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Collings et al. and Erdman et al. It is respectfully submitted that the combination of Collings et al. and Erdman et al. does not render these claims unpatentable for at least the following reasons.

Claim 26 and claims 31 to 33 ultimately depend from claims 39 and 29, respectively, and therefore include all of the features of claims 39 and 29, respectively. As set forth in detail in Section II of this response, Collings et al. do not disclose, or even suggest, all of the features of claims 39 and 29. In addition, Erdman et al. are not relied upon for disclosing or suggesting the features of claims 39 and 29 not disclosed or suggested by Collings et al. Accordingly, it is respectfully submitted that the combination of Collings et al. and Erdman et al. does not render unpatentable claim 26 and claims 31 to 33, which ultimately depend from claims 39 and 29, respectively.

In view of all of the foregoing, withdrawal of this rejection is respectfully requested.

VI. Rejection of Claim 38 Under 35 U.S.C. § 103(a) ("Yoshimura" and "Horng et al.")

Claim 38 was rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Yoshimura and U.S. Patent No. 6,396,231 ("Horng et al."). It is respectfully submitted that the combination of Yoshimura and Horng et al. does not render claim 38 unpatentable for at least the following reasons.

Claim 38 ultimately depends from claim 29 and therefore includes all of the features of claim 29. As set forth in detail in Section III of this response, Yoshimura does not disclose, or even suggest, all of the features of claim 29. Horng et al. merely describe a fan motor with two-step speed control, including a buffer circuit, a control voltage terminal and a fan, but are not relied upon for disclosing or suggesting the features of claim 29 not disclosed or suggested by Yoshimura. Accordingly, it is respectfully submitted that the combination of Yoshimura and Horng et al. does not render unpatentable claim 38, which ultimately depends from claim 29.

In view of all of the foregoing, withdrawal of this rejection is respectfully requested.

VII. Conclusion

It is therefore respectfully submitted that all of the presently pending claims are allowable. All issues raised by the Examiner having been addressed, an early and favorable action on the merits is earnestly solicited.

Respectfully submitted,

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